

Enhancing farm productivity and profitability by technological interventions

through farmers' participatory approach in Hisar district

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Location and selection of area

Two villages, viz. Bure and Dubetta were selected from Hisar district of Haryana. The area was selected due to various problems identified in this region, viz. villages are semi-arid having sandy loam soils with inadequate canal water, brackish underground water, lack of awareness about high yielding new varieties of crops, conservation technologies and animal health, etc. Moreover, the technical knowledge available with the farmers has hardly been utilised so far in a scientific way to derive suitable options for the better production along with the scientist.

Farm families: 1000 farm families were taken from the selected villages i.e. 600 from Bure and 400 from Dubetta.

OBJECTIVES

- To enhance farm production and profitability through farmer participatory mode in major crops and subsidiary enterprises.
- To develop linkages with all stakeholders in various production systems.
- To develop the knowledge, skill and attitude in crop management and



subsidiary enterprises among the farmers/beneficiaries through Front Line Demonstrations, Exposure visits, Trainings, Field days, Kisan Goshties and Mini Kisan Melas etc.

- Impact assessment of technologies in different production systems.

INTERVENTIONS

Crop based module

Popularization and adoption of of summer/kharif moong var. MH 421

Rationale of the intervention: Small and marginal category of farmers were beneficiaries of this module. In rice-wheat and bajra-mustard cropping systems, the land remains fallow for about two months

after the harvest of wheat and mustard crop. For this purpose, module was introduced as summer moong may be the best option for utilization of land and time in this period. Being a legume crop, it also improves the fertility status of the soil by atmospheric nitrogen fixation in root nodules, which economize on the saving of nitrogen requirement for succeeding crop. In recent years, MH 421 is becoming popular among farmers as it is a short duration variety that matures in 60-65 days as well as provides higher yield compared to other moong varieties.

Outcome: Farmers can easily earn an additional income of ₹ 10,000–

Shri Karambir Singh, 60 year old, from Bure village cultivated var. MH 421 in 0.4 ha area and earned ₹ 42,215 from 65 days crop.



15,000 from an area of 0.4 ha by cultivating improved variety of summer moong i.e. MH 421 (₹ 45,297) over local genotype (₹ 30,987). Hence, it can be recommended for larger scale cultivation in Haryana condition.

Integrated approach for management of whitefly in cotton var. Rasi 776 BG-II

Rationale of the intervention:

Cotton is one of the most important cash crop which has been cultivated in Haryana since time immemorial. It is attacked by number of insect-pests (subterranean, bollworm and sucking insect-pests) starting from germination to the harvesting of the crop. After the introduction of *Bt* cotton, the problem of bollworms has been resolved. However, sucking pests like whitefly, thrips, leafhopper and aphids are continued to cause damage during different stage of crop growth. Among sucking insect-pests, whitefly, *Bemisia tabaci*, is one of the most important pest causing both direct and indirect damage to the crop. Whitefly suck the cell sap from leaves, resulting into the yellowing, curling of leaves and also secretes honey dew on which sooty mould grows, which ultimately affects the photosynthetic activity of this crop. Thus, such intervention of cultivating the crop by applying different insecticides at proper time and dose to control whitefly has been taken.

Outcome: Cultivation of cotton

Shri Dharmpal Singh, 50 year old, of Dubetta, Hisar, Haryana practiced Integrated pest management in cotton and earned an profit of ₹ 10,290 per acre.



with proper management like proper spacing (30-45 × 75 cm) and application of two sprays of each insecticides, viz. Dimethoate 30EC and Nimbecidine 300 ppm at economic threshold of whitefly i.e. 6 adults/leaves gave higher yield (1815 kg/ha), more net income (₹ 48,677/ha) in intervention plot as compared to farmer practice plot (yield: 1707 kg/ha; net income: ₹ 40,492/ha).

Varietal performance of wheat (var. WH 1105, HD 2967, HD 3086 and WH 711).

Rationale of the intervention:

The wheat varieties differ significantly with each other in growth, yield, maturity and quality traits. The varieties behaved differently in different soil types, irrigation facilities and climatic conditions. The farmers remains in confusion that which variety is suitable for his farm. Keeping in view all these facts, the demonstrations of three improved and high yielding varieties (WH 1105, HD 2967 and HD 3086) were conducted at farmers' field along with variety WH 711 as farmer practice.

Outcome: Shri Rambhagat under this module, cultivated different varieties and observed that all three varieties performed significantly better than WH 711. He reported that average yield of 51.1, 54.6 and 50.2 q/ha was recorded in varieties WH 1105, HD2967 and HD 3086, respectively in comparison to WH 711 which yielded 49.4 q/ha. In all the varieties including farmers' practice, the cost of cultivation was same i.e. ₹ 43,560/ha. A maximum net income (₹ 60,904 q/ha) was obtained from variety HD 2967, followed by WH 1105 (₹ 54,464/ha) and HD 3086 (₹ 52,808/ha).

Integrated nutrient management in wheat var. WH 1105

Rationale of the intervention:

The wheat is dominant *rabi* cereal crop of North-Western zone of India.

Haryana which is the major wheat growing state owns a prestigious status in wheat production. But in the last decade, a plateau in wheat productivity is noticed which is an outcome of the imbalanced use of fertilizers that can cause yield loss and

lower crop quality. Due to increased productivity of the crops, the native soils have been depleting their nutrient reserve and the crops started responding to micro-nutrient application. The over-fertilization also resulted in poor soil physical, chemical and biological properties. Keeping in view, this module was undertaken and demonstrations were conducted at farmers' field using the standard package of practice for nutrient application. For this purpose, nitrogen (150 kg/ha), phosphorous (60 kg/ha), potash (30 kg/ha) and zinc sulphate (25 kg/ha, 21%) were applied as per the package of practices of CCSHAU, Hisar.

Shri Balraj, aged 50 years of village Dubetta started adopting INM in wheat under Farmer FIRST Programme since 2018.



Apart from chemical fertilizer, the seed was also treated with azatobacter and phosphate solubilizing bacteria (PSB) before sowing.

Outcome: After the intervention, the income of the farmer increased to ₹ 7872/ha during the year 2018-19 and ₹ 8132/ha during the year 2019-20. Moreover, the soil nutrient reserve also increased.

NRM based module

Bed planting technique in wheat var. WH 1105

Rationale of the intervention:

Water is very precious natural resource and its judicious use in agriculture is the prime need of the day. The quantum of irrigation water is declining day-by-day which ultimately affect the crop yield and income of farmer. There are number of water conservation technologies available, but under water scarcity

situations, bed planting technique in wheat is a suitable and water saving technology. Levelling of field is a pre-condition for the success of this technology. The field preparations, bed formation, placement of fertilizer and sowing of seed is completed in one operation by bed planter. Furrows are used for irrigation as well as for drainage of excess water, if there is heavy rain, during crop season. The direction of sowing should be North-South so that every plant gets equal sunshine. In situations where sowing is expected to be delayed due to pre-sowing irrigation, dry seeding can also be done on raised beds followed by irrigation immediately after seeding. It saves 20-25% seed i.e. 30 to 32 kg/acre seed is sufficient for sowing. This technology is suitable for seed production because of production of bold grain and easy rouging by moving in furrows to uproot unwanted plants. Whereas, it also results in effective control of weeds and avoids the compactness of soil. Similar yield was observed as in

Table 1. Income generated from bed planting technique and conventional tillage (2019–20)

	Bed planting technique	Conventional tillage
Area	0.4 ha	0.4 ha
Yield (q/ha)	50.75	50.20
Cost of cultivation (₹/ha)	43204	44290
Net income (₹/ha)	64489	62345
B:C ratio	2.49	2.40
Water saving on time basis	40%	—
Average water saving in terms of monetary returns	3750	—

conventional tillage with substantial saving of seed, fertilizer nitrogen and irrigation water.

Outcome: After the intervention, Shri. Subash Singh earned a net income of ₹ 64,489/ha in comparison to conventional method of irrigation i.e. flood irrigation (₹ 62,345/ha). Moreover, by using this technique a saving of about 40% irrigation water was also noticed which is the most focussed issue of the nation i.e. *‘More Crop Per Drop’* (Table 1).

Horticulture based module

Adoption and popularization of guava cultivation

Rationale of the intervention: Guava (*Psidium guajava* L.), the ‘poor man’s fruit’, or ‘apple of the tropics’ is a popular tree fruit of the tropical and subtropical climate. In

addition to this, it also gives good economic returns involving very little input. But, the farmers in these villages are adopting traditional agriculture and there is lack of awareness and technical know-how about production technology of guava crop. Due to all these facts, FFP introduced this module and 14 farmers were motivated to establish a high-density guava orchard in Bure and Dubetta villages. A guava orchard was established by planting 700 guava saplings of high yielding variety Hisar Safeda in fourteen farmers’ fields, at the rate of 50 saplings in each field.

Outcome: Farmers were satisfied with this intervention, as it provides them an additional income in comparison of traditional agriculture alone.

Livestock based module

Supplementation of ration with mineral mixture

Rationale of the intervention: Livestock farming is one of the common ways of income generation for most of farmers in many villages of Haryana for living. Farmers were continuously rearing murrah buffalo without scientific knowledge. When PRA was done in these villages, many

Shri Subash, aged 67 years from village Bure started growing wheat on beds since 2016.



Dr R.S. Sheoran, Co-PI, FFP, CCSHAU, Hisar giving wheat seed to Shri Subash under FFP.



Before FFP (2016)



After FFP (2017)

buffalo owners were complaining of poor health and reproduction problems in buffaloes i.e. anoestrous or repeat breeding, poor conception rate, lack of heat signs, problem of ecto-parasite and poor milk yield were observed. Keeping this in view, one module was selected on popularization of mineral mixture among the buffalo owners. The farmers were given mineral mixture @ 60 g per day to supplement it to fodder/feed of one buffalo/farmer. A total of 750 buffalo owners of 2 villages were benefitted by distributing mineral mixture. Moreover, owners were imparted training for proper feeding schedule according to age and lactation yield, benefit of A.I., preservation of fodder (hay and silage technique) and importance of mineral mixture so that farmers will become aware about the benefits of these practices and get more milk yield and less problem of reproduction health issues. Three exposure visits were also organized to show them importance of proper management techniques.

Outcome: As minerals are mostly deficient in soil *vis-a-vis* in feeds/fodders of the animals, therefore, animals are also deficient in these minerals. These play important role in immunity, cellular functions and other productive and reproductive functions in animal system. So, farmers were satisfied, as it resulted in increased milk production. After intervention, an average milk yield of 8.33 litre/animal/day was observed in comparison to farmers' practice (7.70 litre/animal/day) and the cost of production of ₹ 220/litre was

Farm machineries and equipments procured by the FFP, CCS Haryana Agricultural University, Hisar

Item	Quantity (nos.)
Zero tillage machine	05
Bed planter	02
Raised bed planter	01
Laser land leveller	01
Rotavator	01
Power weeder	01
Urea spreader	02
Cultivators	02
Cotton stalk shredder	01
Cotton weeder	01
Power weeder (Tractor operated)	01



Distribution of mineral mixture under Farmer FIRST.



Sh. Rambhagat Panghal, a progressive dairy farmer from vill. Bure, honoured by Dy. CM, Haryana for rendering best services under FFP.



Training programme on importance of mineral mixture.

incurred in intervention whereas; ₹ 215/litre were spent in farmers' practice.

TRAINING

Farmer FIRST Programme, CCSHAU, Hisar imparted different training programme to the farmers of the project for skill development.

- Production technologies of summer moong.
- Orobanche management in mustard.
- Integrated nutrient management in

wheat.

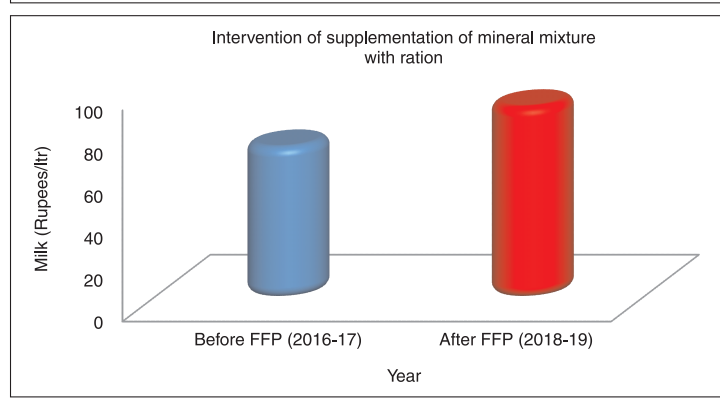
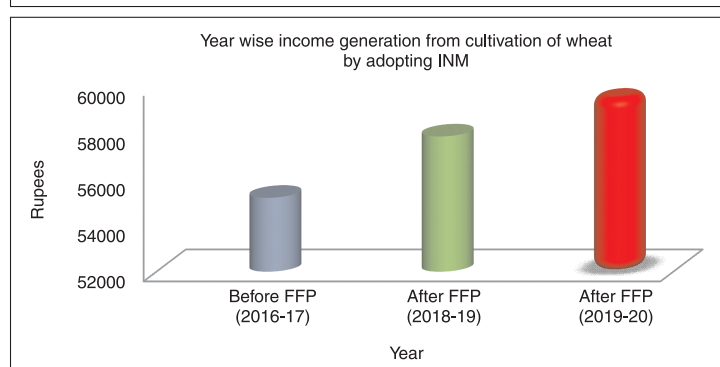
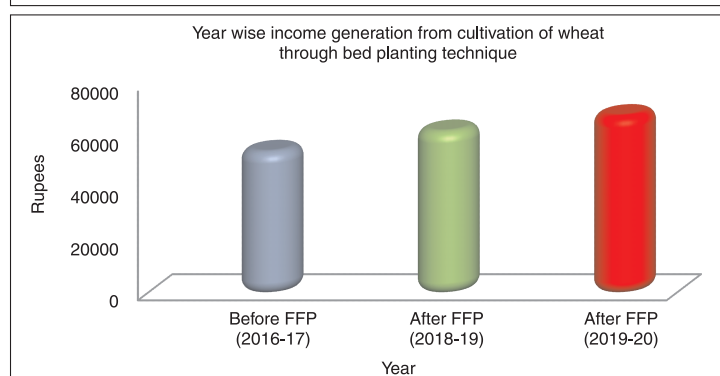
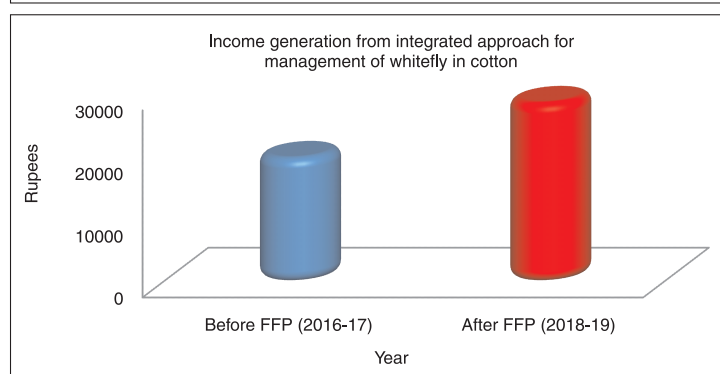
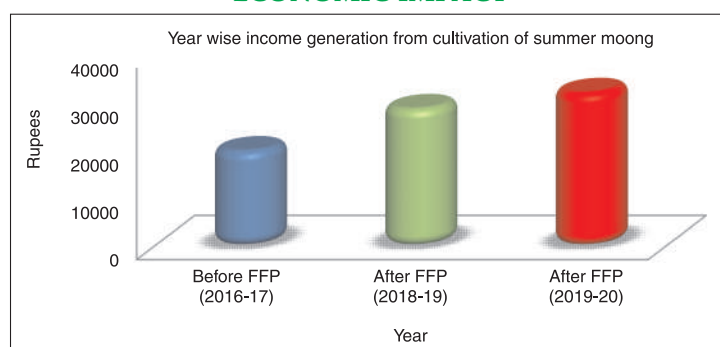
- Bed planting technique in wheat.
- Cultivation of improved varieties of wheat.
- Importance of mineral mixture in animal health.
- Production technology and post harvest handling of fruit crops.

IMPACT

Social impact

The farmers are socially motivated towards diversification as they

ECONOMIC IMPACT



observed profit and social recognition. Moreover, the farmers gained more income due to demonstrations under FFP that ultimately upscaled their social status and made their livelihood secure. Fellow farmers of selected villages and near by villages also got influenced by the farmers of FFP, CCSHAU, Hisar.

LESSONS LEARNT

- Unavailability of quality seed in time.
- Moisture stress at critical stages of crop growth which results in lesser yield.
- Whitefly (*Bemisia tabaci*) is a major agricultural pest in different crops and has developed resistance to major insecticide classes. Therefore, a knowledge-intensive and multidisciplinary approach needed to qualify as a model for future agricultural transitions.
- Bed planting technology in wheat benefits the farmers, but its successful adoption depends on a favourable confluence of technical, economic and institutional factors.
- Lack of access to good physical, economic/financial, social infrastructure such as marketing and processing facilities, godowns, etc.
- Need of advanced capacity building of farmers on post harvest and value addition.

WAY FORWARD

- Bed planting technique in wheat will be a new intervention for farmers as it facilitate control of weed and other pests, handle nutrients, reduce tillage, manage crop residues, etc. which ultimately reduces the cost of cultivation of wheat and enhance the farmers income. Moreover, by using this technique, a saving of about 40% irrigation water was also noticed which is the most focussed issue of the nation i.e. 'More Crop Per Drop'.
- Needed horizontal extension of villages under Farmer FIRST Programme.
- Water requirement was a major problem faced by farmers during crop growing period, so water harvesting structures should be developed.
- Provision of quality seeds and nutrients based on soil health of each field.
- Needed large scale investment in warehousing and cold chains to prevent post-harvest crop losses.
- Project villages may be developed as agro-eco-tourism spots in PPP mode.
- Creation of district level farm markets and removing distortions.
- More emphasis may be given in creating awareness about opportunities available for commercialisation and diversification, better technologies, facilities, markets insurance, climate change and government policies.